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Imaging

EFFECT OF TRANSCATHETER AORTIC VALVE REPLACEMENT ON THE MITRAL VALVE

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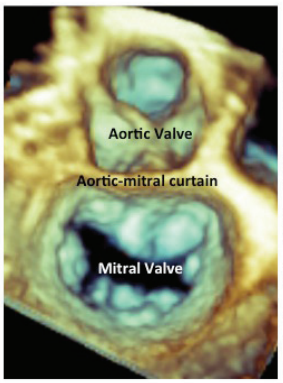
Background: Normal aortic and mitral valves function in a reciprocal interdependent fashion. We hypothesized that both the mitral valve and left ventricular function (LVF) are affected by severe aortic stenosis (AS) and that they would remain altered after transcatheter aortic valve implantation (TAVI). We studied aortic-mitral coupling (AMC) in AS patients undergoing TAVI and compared them to patients without AS with normal and with reduced LVF.

Methods: 3D TEE (Philips iE33) was performed on 33 patients: 15 controls with normal valves and LVF; 9 with AS, studied pre- and post-TAVI; and 9 with systolic heart failure (SHF) and normal valves. Custom software tracked the aortic and mitral annuli (MA), allowing automated measurements of aortic and mitral valve morphology, angle and motion.

Results: AS patients had significantly reduced MA displacement and MA areas compared to controls (Table). Post-TAVI, MA displacement and MA area were reduced and the aortic-MA angle was wider. SHF patients had significantly larger MA areas and aortic-MA angles with reduced MA displacement.

Conclusions: AS patients have reduced MA size and displacement. After TAVI, MA size remains reduced due to the presence of the calcified aortic valve, which is compressed along the aortic root by the TAVI valve struts. This may also contribute to the increase in aortic-mitral angle post-TAVI. LVF improves post-TAVI with greater MA displacement. Long-term effects of TAVI on the mitral valve need further investigation.



	Control (n=15)	AS Pre-TAVI (N=9)	AS Post-TAVI (N=9)	SHF (N=9)
Mitral Annular Area				
Systole, cm sq.	10.0±2.2	7.3±1.8[a]	6.8±1.9[a]	12.3±1.6[abc]
Diastole, cm sq.	12.2±2.5	8.4±1.8[a]	8.2±2.0[a]	14.2±1.6[ac]
Aortic Annular Projected Area				
Systole, cm sq.	5.4±1.0	4.0±1.9[†]	3.3±0.3[a]	6.5±1.0[abc]
Diastole, cm sq.	4.3±1.1	3.4±1.6	2.9±0.3[a]	5.3±-0.8[abc]
Mitral-aortic angle				
Systole, degree	116±12	122±4	132±9[ab]	130±9[bc]
Mitral Annular Displ., mm	9.8±3.2	4.9±2.0[a]	5.9±2.2[a]	4.3±1.4[ac]

AS=aortic stenosis, TAVI=transcatheter aortic valve implantation SHF=systolic heart failure
[a] p<0.05 compared to Controls, [b]p<0.05 compared to AS (Pre-TAVI), [c]p<0.05 compared to AS (Post-TAVI), [†] p<0.1 compared to Controls